Amendments to the Specification

Please replace paragraphs [0016]-[0018] on Page 5 of the specification as originally filed with the replacement paragraphs set out below.

[0016] One embodiment includes a mixing device having a tubular mixing chamber with a tangential inlet, which injects a stream of fuel such that the stream of fuel that flows tangentially along the inside of the tubular mixing chamber, and an axial inlet, which injects a stream of oxidant along the longitudinal axis of the tubular mixing chamber. The oxidant and the fuel are mixed by the tangential motion of the fuel and form a reactant feed gas suitable for use in a reactor. The tubular mixing chamber may also include one or more secondary flow conditioners to further develop the flow before it enters a reactor. Preferred secondary flow conditioners include permeable mixing material, such as ceramic beads.

[0017] An alternative embodiment includes a mixing device having a tubular reactor inlet chamber with a lower end connected to the reactor and an upper end having a pressure relief device. A tubular mixing chamber is connected to the reactor inlet chamber at a reactant gas inlet so that the longitudinal axis of the mixing chamber is at an angle to the longitudinal axis of the reactor inlet chamber. The mixing chamber has an axial inlet, which injects an oxidant into the mixing chamber along its longitudinal axis, and a tangential inlet, which injects the fuel tangentially along the inside of the mixing chamber. The mixing chamber may also include a secondary flow conditioner, such as permeable mixing material, disposed between the tangential inlet and the reactant gas inlet. The reactor inlet chamber is preferably substantially free of obstructions between the lower end and the upper end.

[0018] Another embodiment includes a method for mixing a reactant gas for a partial oxidation reactor by injecting an oxidant along the longitudinal axis of a tubular mixing chamber and injecting a fuel tangentially along the inside of the tubular mixing chamber so that the fuel mixes with the oxidant to form a reactant gas. The reactant gas is then injected into a tubular reactor inlet chamber at an angle to the longitudinal axis of the inlet chamber and then injected into the reactor. The reactant gas may also be further conditioned by a secondary flow conditioner within the tubular mixing chamber.

Please replace paragraph [0031] on Pages 7-8 of the specification as originally filed with the replacement paragraph set out below.

[0031] Figures 1A and 1B depict a mixing section 100 having an elongated tubular chamber 110, an axial inlet 120, a tangential inlet 130, a centrifugal mixing region 140, and secondary flow conditioner 150. Secondary flow conditioner 150 is shown as a permeable mixing material, such as ceramic beads, but may be of any desired form. A gaseous oxidant is injected through axial inlet 120 into tubular chamber 110. Axial inlet 120 is preferably proximate to centrifugal mixing region 140. A stream of fuel, such as natural gas, is injected through tangential inlet 130 into centrifugal mixing region 140 so as to form a stream of fuel flowing tangentially around the inside wall of mixing region 140. The fuel stream acts to surround the oxidant stream and prevents the oxidant stream from impinging on the wall of chamber 110. The tangential spinning motion of the fuel stream ~~cause~~ causes the fuel stream and the oxidant stream to mix as the gases travel downstream in tubular chamber 110.

Please replace paragraphs [0035]-[0037] on Pages 9-10 of the specification as originally filed with the replacement paragraphs set out below.

[0035] Referring now to Figure 2, mixing section 100 is shown installed on reactor inlet section 200 that includes an inlet chamber 210. Inlet chamber 210 is preferably an elongated tubular chamber that feeds a reactor (not shown) at its lower end 220 and has a pressure relief device 230 disposed on its upper end 240. Mixing section 100 connects to <u>inlet</u> chamber 210 at reactant inlet 250 at an angle α such that the gases exiting mixing section 100 flow smoothly toward lower end 200 and the reactor. This angle α can be any angle between 0 and 90° from the longitudinal axis of inlet chamber 210. The longitudinal axis of mixing section 100 is preferably at an angle α between 30 and 60 degrees from the longitudinal axis of inlet chamber 210.

[0036] The arrangement of <u>inlet</u> chamber 210 and mixing section 100 allows a clear path from the reactor to upper end 240 and pressure relief device 230 so that, in the case of an emergency or backlight situation, the path between the reactor and the pressure relief device is not obstructed. Pressure relief device 230 is preferably located as close to reactant inlet 250 as possible in order to minimize the area available for gas to collect above the reactant inlet and below the pressure relief device. The area between reactant inlet 250 and pressure relief device 230 may also preferably have a means for injecting a sweep gas in order to prevent flammable gases from collecting near the pressure relief device. In a backlight situation, the sweep gas will prevent excessive heat from reaching pressure relief device 230, which could reduce the performance characteristics of the device. One ~~preferably~~ <u>preferred</u> sweep gas is nitrogen.

[0037] Reactant inlet 250 is preferably located at a distance of at least twice the diameter of inlet chamber 210 from lower end 220 so as to provide a well distributed flow profile as the reactant gases enter the reactor. The inner wall of inlet chamber 210 may also have additional mixing means to further condition the flow of feed gas entering the reactor. These additional mixing means are preferably close to the wall so as not to interfere with the unobstructed path between the reactor ~~to~~ and the pressure relief device.

Please replace paragraphs [0039] and [0040] on Pages 10-11 of the specification as originally filed with the replacement paragraphs set out below.

[0039] Figure 3 shows an alternative embodiment of a reactor inlet section 300 that is fed by multiple mixing sections 100. The multiple mixing sections 100 may be located so that the flow from each mixing section enters on opposite sides of inlet section 300. Mixing sections 100 are each arranged at an angle Φ_1, Φ_2 from the ~~center line~~ longitudinal axis of inlet section 300. Angles Φ_1, Φ_2 can be any angle between 0 and 90° from the longitudinal axis of inlet section 300, and may preferably be arranged at angle between 30 and 60 degrees from the longitudinal axis of inlet section 300. The total angle β between the longitudinal axes of mixing sections 100 should be less than 180°, and is preferably less than 120°, and more preferably between 60° and 120°.

[0040] Referring now to Figure 4, an alternate embodiment of a reactor inlet section 400 including an offset mixing section 410 and an inlet chamber 420. Mixing section 410 includes a centrally located oxidant inlet 412 and a fuel inlet 414. Inlet chamber 420 includes inlet 422, reactor ~~outlet~~ inlet 424, and secondary outlet 426. Secondary outlet 426 is preferably in

communication with a relief device 428. Inlet chamber 420 may also include a sweep gas inlet 430.

Please replace paragraph [0045] on Page 12 of the specification as originally filed with the replacement paragraph set out below.

[0045] Mixing plate 516, which can be seen in Figure 6, covers both central oxidant inlet 512 and annular fuel inlet 514. Oxidant is allowed to freely flow while the fuel flow is interrupted by a plurality of orifices 515. Orifices 515 create a turbulent flow in the fuel, which causes the fuel to mix with the oxidant as the <u>oxidant and fuel</u> flow<u>s</u> combine and move into inlet chamber 520.